

MU Guide

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Seeding Rates, Dates and Depths for Common Missouri Forages

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The first step in forage management is the proper establishment of pasture and hay fields. This in turn depends on proper seeding. If the seeding rate is too low, the stand will be thin and weedy. If it is too high, establishment costs will be prohibitive. If the seeding rate is ideal, stands can still fail by planting at improper depths or times.

This guide presents rates, depths and dates for seeding common Missouri forages. The following tables contain annuals, perennials, and biennials, as well as grasses and legumes. This information is based on research and professional experience in Missouri and, when appropriate, from surrounding states.

Using the tables

The tables report broad ranges for seeding rates and planting dates for both pure stands (Table 1) and mixtures (Table 2). These broad ranges reflect the diverse environmental and managerial practices in

Missouri forage operations. The dates are based on typical conditions for central Missouri. Therefore, for northern Missouri, early fall and late spring dates are advised. For southern Missouri, the opposite adjustments are suggested. The higher rates are appropriate for average to poor soils and for broadcast seeding.

Remember that these rates and dates are only guidelines; they apply to typical pasture and hay operations, not to extreme conditions. The rates do not include "shotgun mixtures," because such mixtures are based on limited experience and data. They do, however, include rates for simple mixtures common to Missouri pastures and hayfields.

Seeding rates for the native warm-season grasses do not coincide completely with rates suggested by conservation groups. The rates suggested here for native grasses apply to pure stands rather than native ranges, average soils rather than alluvial soils, and livestock production rather than wildlife habitat and ground cover.

For more information on forages, refer to these guides from Extension Publications, 1-800-292-0969.

G 4515 Annual Lespedeza
G 4558 Sclerotinia Crown and Stem Rot of Alfalfa
G 4610 The Bluegrasses
G 4620 Bermudagrass
G 4639 White, Ladino and Sweet Clover
G 4642 Establishing Birdsfoot Trefoil in Bluegrass Sod
G 4649 Reed Canarygrass, Ryegrass, and Garrison Creeping Foxtail
G 4650 Establishing Forages
G 4651 Renovating Grass Sodds With Legumes
G 4661 Warm-Season Annual Forage Crops
G 4671 Eastern Gamagrass
G 4672 Smooth Bromegrass
G 4673 Big Bluestem, Indiangrass and Switchgrass
G 4674 Caucasian Bluestem

Table 1. Pure stands.

Type		Seeding rate (pounds live seed/acre)	Seeding date*		Depth (inches)
			Spring	Fall	
GRASSES					
Barley	A, CSG	BR:110–140 DR:80–110		Sept 15–30	1–2
Bermudagrass	P, WSG	20–30 bu/acre sprigged 30 bu broadcast	Mar–May	—	1–2
Bluegrass, Kentucky	P, CSG	BR:10–15 DR:8–10	Jan–Feb	—	$\frac{1}{8}$ – $\frac{1}{4}$
Bluestem, big	P, WSG	6–8	Apr–May	—	$\frac{1}{4}$ – $\frac{1}{2}$
Bluestem, Caucasian	P, WSG	3–4	late Apr–early May	—	$\frac{1}{4}$
Bromegrass, smooth	P, CSG	BR:15–20 DR:10–15	Feb–Mar	Sept	$\frac{1}{4}$ – $\frac{1}{2}$
Eastern gamagrass	P, WSG	DR:10	May	—	
Fescue, tall	P, CSG	BR:15–20 DR:10–15	before Apr 15	before Sept 15	$\frac{1}{4}$ – $\frac{1}{2}$
Johnsongrass	P, WSG	10–20	early spring	—	$\frac{1}{4}$ – $\frac{1}{2}$
Indiangrass	P, WSG	6–8	Apr–May	—	$\frac{1}{4}$ – $\frac{1}{2}$
Millet, pearl	A, WSG	BR:20–30 DR:15	May–early June	—	$\frac{1}{2}$ –1
Oats	A, CSG	80–120	Mar	Sept 15–30	1–2
Orchardgrass	P, CSG	10–15	late Mar–early Apr	late Aug–early Sept	$\frac{1}{4}$ – $\frac{1}{2}$
Reed canarygrass	P, CSG	5–10	early spring	Aug	$\frac{1}{4}$ – $\frac{1}{2}$
Rye	A, CSG	110–160	—	after Sept 15	1–2
Ryegrass, perennial	A, CSG	BR:15–30 DR:15–20	—	late summer–early fall	$\frac{1}{2}$
Switchgrass	P, WSG	6–8	Apr–May	—	$\frac{1}{4}$ – $\frac{1}{2}$
Sudangrass	A, WSG	BR:30–40 DR:20–25	May 5–20	—	1– $\frac{1}{2}$
Timothy	P, CSG	BR:8 DR:3–6	Feb–Mar	Aug 20–Oct 1	$\frac{1}{4}$ – $\frac{1}{2}$
Triticale	A, CSG	70–100	—	Oct	1–2
Wheat	A, CSG	100–150	—	Oct 1–Oct 15	1–2
LEGUMES					
Alfalfa	P, WSL	12–15	before Apr 15	Sept	$\frac{1}{4}$
Birdsfoot trefoil	P, CSL	4–8	Feb–early Mar	fall	$\frac{1}{8}$
Clover, alsike	P, CSL	4–6	early spring	fall	$\frac{1}{4}$
Clover, crimson	A, CSL	BR:20–25	—	July–Nov	$\frac{1}{4}$
Clover, ladino	P, CSL	BR:1–3	Feb–Apr 15	Aug–early Sept	$\frac{1}{4}$
Clover, red	P, CSL	8–12	Feb–Apr 15	Aug 15–Sept 15	$\frac{1}{4}$ – $\frac{1}{2}$
Crownvetch	P, WSL	10–15	Mar 15–May 15	Oct–Apr	$\frac{1}{4}$
Hairy vetch	B, CSL	25–30	—	Oct–Nov 15	1–2
Lespedeza, common	A, WSL	BR:15 DR:10	Mar–Apr	—	$\frac{1}{4}$
Lespedeza, Korean	A, WSL	BR:15 DR:10	Mar–Apr	—	$\frac{1}{4}$
Lespedeza, sericea	P, WSL	25–35	Mar 15–Apr 15	—	$\frac{1}{4}$

Key		
A = annual	CSG = cool-season grass	BR = broadcast
B = biennial	WSG = warm-season grass	DR = drilled
P = perennial	CSL = cool-season legume	
	WSL = warm-season legume	
NOTE: Seeding dates are for Columbia. Plant later in spring and earlier in fall in northern Missouri. Plant earlier in spring and later in fall in southern Missouri.		

Table 2. Mixtures.

Grass-legume mixtures	Seeding rate (pounds live seed/acre)		
Orchardgrass + Alfalfa	6 + 10		
Orchardgrass + Birdsfoot trefoil	3 + 5		
Orchardgrass + Birdsfoot trefoil + Kentucky bluegrass	3 + 5 + 1		
Orchardgrass + Ladino clover	6 + 1		
Orchardgrass + Lespedeza	6 + 15		
Orchardgrass + Lespedeza + Ladino clover	5 + 15 + 1/2		
Orchardgrass + Red clover	6 + 8		
Reed canarygrass + Alfalfa	6 + 10		
Reed canarygrass + Ladino clover + Alsike clover	6 + 1 + 2		
Reed canarygrass + Red clover	6 + 10 or 6 + 8		
Smooth brome grass + Alfalfa	10 + 10		
Smooth brome grass + Birdsfoot trefoil	5–6 + 5		
Tall fescue + Alfalfa	10 + 10 or 15 + 10		
Tall fescue + Alfalfa + Ladino clover	15 + 10 + 1/2		
Tall fescue + Birdsfoot trefoil	5–8 + 5		
Tall fescue + Ladino clover	15 + 1		
Tall fescue + Lespedeza, annual	15 + 15		
Tall fescue + Lespedeza + Ladino clover	15 + 15 + 1/2		
Tall fescue + Red clover	10 + 8 or 15 + 8		
Tall fescue + Red clover + Ladino clover	10 + 6 + 1		
Timothy + Birdsfoot trefoil	2 + 5		
Timothy + Birdsfoot trefoil + Kentucky bluegrass	1 + 5 + 2		
Timothy + Red clover	2 (fall) or 4 (spring) + 8		
Wheat + Hairy vetch	40 + 20 or 40 + 30		
Renovation	Broadcast		Drilled on prepared seedbed
	on undisturbed soil	on tilled soil	
Alfalfa	10	8	6
Birdsfoot trefoil	8	6	4
Ladino clover	1 1/2	1	1/2
Lespedeza	25	20	15
Red clover	10	8	6

Why Forage Seedlings Fail

1. Live seed does not germinate because:
 - a. Impermeable seed coat: This can be overcome by scarifying seed.
 - b. Not enough air: This occurs because seed were sown too deeply or in wet soils.
 - c. Not enough moisture.
2. Seedlings die immediately after germination because:
 - a. Drying: seed placed in loose surface soil may germinate after a light rain, then dry out before developing sufficient roots for establishment.
 - b. Freezing: Seed are sensitive to freezing as the young root breaks the seed coat; temperatures below -3 degrees C are lethal. Soil coverage reduces the likelihood of injury, and once rooted, seedlings can withstand much lower temperatures.
 - c. Light coverage: Soil cover or mulch protects against both drying and freezing; without it, seed establish only when soil surface remains moist for extended periods.
 - d. Heavy coverage: Most wasted seed probably occurs this way.
 - e. Crusted soil surface: This can prevent emergence, especially when seed are sown deeply on fine-textured soils.
 - f. Toxicity: Seed in direct contact with banded fertilizer, improper use of herbicides, herbicide carryover, and autotoxicity can damage seed and young seedlings.
3. Seedlings die after establishment because:
 - a. Undesirable pH: Lime should be applied according to soil test to provide a desirable pH; calcium and magnesium should be applied as nutrients.
 - b. Low fertility: A soil test should be used to ensure adequate phosphorus, potassium, or other nutrients.
 - c. Inadequate legume inoculation.
 - d. Poor drainage: Water accumulation on the surface or in the soil profile can limit growth.
 - e. Drought: This is the reason most commonly given for stand failures.
 - f. Seedling vigor: Some forages, including nurse crops, can compete with forage seedlings for water, light and nutrients.
 - g. Insects and pests.
 - h. Winterkill: Seeding too late in the fall or seeding poorly adapted cultivars can cause winterkill.

SOURCE: Adapted with permission from Vough, L. R., A. M. Decker, and T. H. Taylor. 1995. Forage establishment and renovation. P. 42 in Barnes, Miller and Nelson, eds. Forages, 5th ed. Iowa State University Press, Ames.



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